

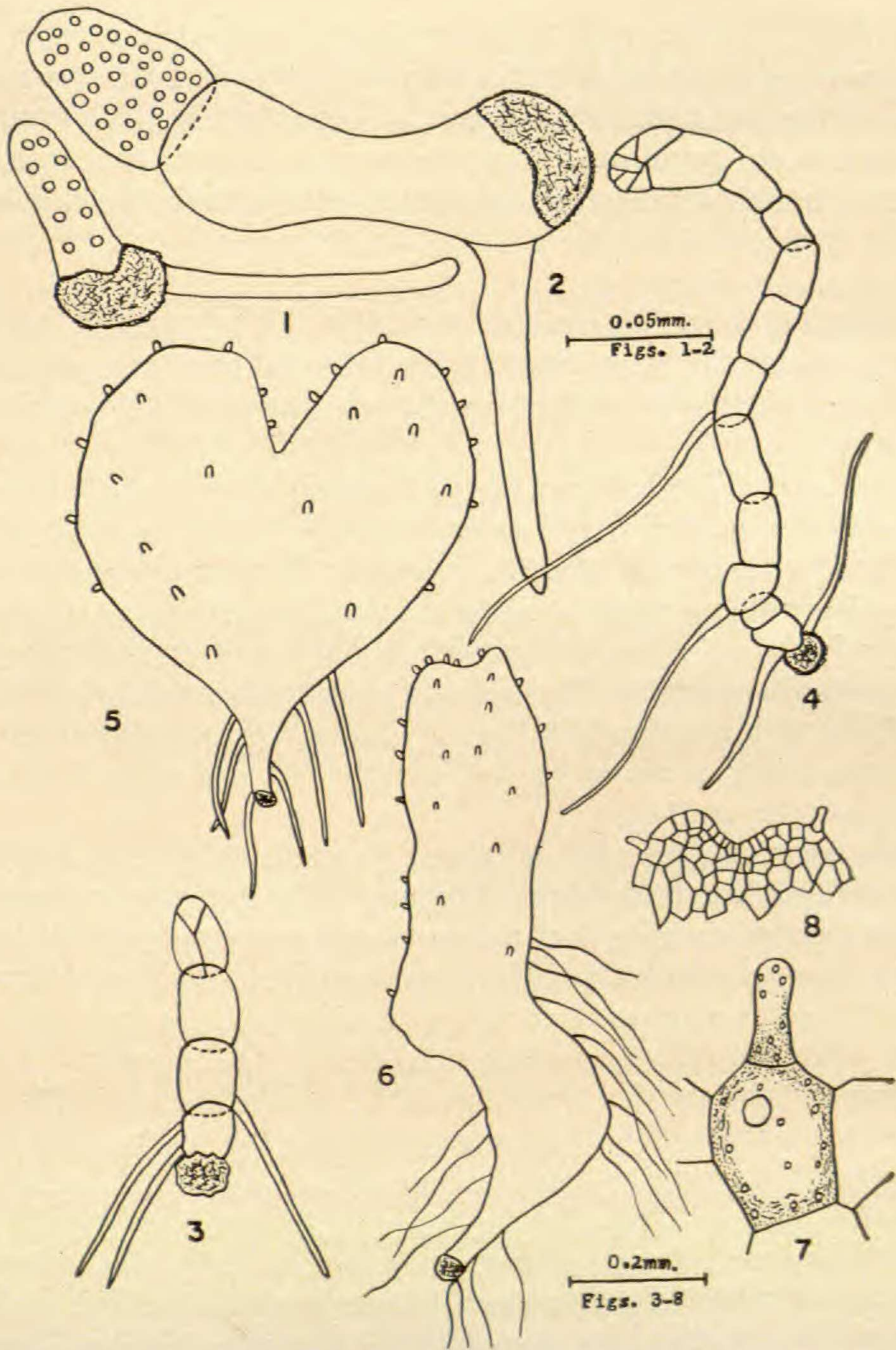
A Note on the Gametophytes of *Cystopteris tenuisecta*

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Taxonomically the genus *Cystopteris* Bernh. was divided into two subgenera, *Cystopteris* and *Acystopteris*, by Blasdell (1963). Gametophytes of several members of subg. *Cystopteris*, such as *C. douglasii*, *C. protrusa*, *C. diaphana*, *C. bulbifera*, and *C. fragilis* (Blasdell, 1963; Kaur, 1963; Bir & Trikha, 1970), have been studied, but up until now no observations have been made on the gametophytes of members of subg. *Acystopteris*, to which the Asiatic species *C. tenuisecta* (Blume) Mett. belongs. Furthermore, this species has also been referred to *Cornopteris* by Tardieu-Blot (1958). Therefore, the present study was made to find out the relationship of *C. tenuisecta* to the other members of the genus and also to see if it really belongs to *Cystopteris* or not.

Cystopteris tenuisecta grows luxuriantly along open roadsides at Tiger Hill (alt. 2,400 m), Darjeeling (Eastern Himalayas). Both tetraploid sexual ($n = 84$) and triploid hybrid ($2n = 126$) individuals are abundant (Bir, 1961). The present study concerns only spores collected from tetraploid plants because the spores of the triploid did not germinate even after several trials. Gametophytes were raised by sowing the spores on full strength as well as on half-strength Knop's Solution. These were transferred to sterilized garden soil in pots when they were just expanded.

Freshly collected spores take about five or six weeks to germinate. Early stages of germination are very like those described earlier for other leptosporangiate ferns, such as *Hypodematium crenatum* (Loyal, 1960) and *Diplazium (Athyrium) esculentum* (Mehra, 1949; Nayar, 1960). On germination the exine ruptures irregularly near the central region of the spore, and a green germ filament emerges, followed by the first rhizoid. Sometimes after exine rupture the rhizoid emerges before the germ filament (Figs. 1, 2). When the germ filament becomes 4-6-celled, an apical cell is cut off by formation of two oblique walls in the terminal



GAMETOPHYTES OF *CYSTOPTERIS TENUISECTA*. FIGS. 1-4. FILAMENTOUS STAGE. FIG. 5. MATURE PROTHALLUS. FIG. 6. PROTHALLUS IN CROWDED CULTURE. FIG. 7. MARGINAL PAPILLATE HAIR. FIG. 8. PROTHALLUS MARGIN.

cell (*Fig. 3*). In crowded cultures much elongated filaments are produced before an apical cell is organized (*Fig. 4*). Lateral expansion of the prothallus takes place subsequently by longitudinal division in the penultimate cells of the germ filament and by successive lateral divisions of the apical cell on both of its sides. These divisions give rise to a spatulate prothallus. The apical cell is soon replaced by an apical meristem, and this results in formation of a typical, cordate prothallus (*Fig. 5*) with an apical notch, except in those cases where the cultures are crowded (*Fig. 6*). Usually the cordate condition is attained in about three months.

The mature gametophytes resemble closely those of other higher leptosporangiate ferns. The central cushion is two or three cells thick. The margin is smooth. Marginal hairs start developing after the apical meristem is established and the prothallus becomes notched (*Fig. 8*). After this, superficial hairs develop generally on the prothallus surfaces. The hairs are unicellular, papillate, chlorophyllous, and non-glandular (*Fig. 7*). The sex organs appear when the gametophytes are about four months old, and their development is of the usual type.

The gametophytes of *C. tenuisecta* resemble those of *C. fragilis* (Kaur, 1963) and *C. douglasii* (Blasdell, 1963) in having a smooth margin and short hairs that appear late in gametophyte development. The gametophytes differ from those of *C. diaphana*, which have irregular margins at maturity and longer hairs that appear soon after the cell plate stage is initiated. The marginal, non-glandular hairs on the prothallus of *C. tenuisecta* are similar to those on the prothalli of *Diplaziopsis javanica* (Bir, 1970), *Athyrium japonicum*, *A. thelypteroides* (unpubl. data), and *Hypodematium crenatum* (Loyal, 1960). On the basis of gametophyte characters, *C. tenuisecta* is correctly placed in *Cystopteris* subg. *Acystopteris*, not in *Cornopteris*. Furthermore, *Cystopteris* is closely allied to the Athyroid ferns that have close affinities to the Dryopteroid ferns.

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The Lectotype of *Polypodium leptophyllum* L.

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Anogramma leptophylla (L.) Link (Fil. Sp. 137. 1841) is a rather common and widespread fern occurring in both the Old and New Worlds. It is based on *Polypodium leptophyllum* L. (Sp. Pl. 1092. 1753). So far as I know, no one attempted to pick out a lectotype for this species until Pichi-Sermolli (*Webbia* 21: 497-502. 1966). However, I am unable to agree with the lectotype chosen or the method of selection.

The original publication is as follows:

- leptophyllum* 46. *Polypodium*? frondibus bipinnatis: sterilibus brevissimis; pinnis cuneiformibus lobatis. *Magn. monsp.* 5. t. 5.
Adiantum minimum, folio vario. *Magn. monsp.* 5, t. 5.
Adiantum filicinum leptophyllum elatius hispanicum. *Barr. rar.* 1270 t. 431, opt.
Habitat in Hispania, Lusitania, Galloprovincia.

Pichi-Sermolli wrote: "Linné gives Magnol's and Barrelier's phrase names and adds no original description of the species, as he